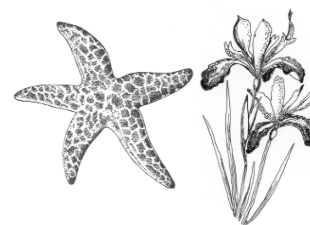




Creating **COASTAL STEWARDSHIP** *through Science*



Defining Habitats

Post-Visit Activities

What Can We Learn from Our Field Journals? 125

How Do I Choose and Complete the Best
Stewardship Project? 145

What Can We Learn from Our Field Journals?

Drawing on their field observations, students will examine food chains, food pyramids, and species distribution. Students will then identify threats to native habitats and develop strategies to monitor habitat health and compare them against current monitoring strategies in practice at Point Reyes National Seashore.

Time required: two, one-hour lessons

Location: classroom

Suggested group size: entire class

Subject(s): biology, ecology

Concept(s) covered: species identification, ecological principles, resource management

Written by: Steve Anastasia, Christie Denzel Anastasia, and Lynne Dominy, National Park Service

Last updated: 10/09/00

Student Outcomes

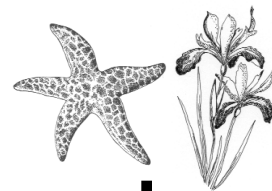
At the end of this activity, students will be able to:

- Determine distribution of species and habitats at Point Reyes.
- Create food webs and food pyramids.
- Identify methods for monitoring ecosystem health.

California Science Standard Links (grades 6–8)

This activity is linked to the California Science Standards in the following areas:

- 6th grade
- 2a- water running downhill is a dominant process on the landscape
 - 2b- rivers and streams are dynamic systems
 - 2c- beaches are dynamic systems in which sand is supplied by rivers
 - 2d- earthquakes, landslides, and floods change human and wildlife habitats
 - 4e- differences in elements such as pressure may result in changes of weather
 - 5a- food webs
 - 5b- organisms and the physical environment
 - 5c- organisms can be categorized by functions they serve in an ecosystem
 - 5d- different organisms may play similar ecological roles in similar biomes
 - 5e- resources available and abiotic factors



Post-Visit

Lesson Plan

Creating
COASTAL STEWARDSHIP
through Science





- 7a- develop a hypothesis
- 7b- use appropriate tools/technology to perform tests, collect/display data
- 7c- develop qualitative statements about the relationship between variables
- 7d- communicate the steps and results from an investigation
- 7e- evidence is consistent with a proposed explanation
- 7f- interpret a simple scale map
- 7th grade 7a- use appropriate tools/technology to perform tests, collect/display data
- 7b- utilize a wide variety of print and electronic resources
- 7c- communicate logical connections
- 7d- construct scale models, maps and appropriately labeled diagrams
- 7e- communicate the steps and results from an investigation
- 8th grade 9a- plan and conduct a scientific investigation to test a hypothesis
- 9b- evaluate the accuracy and reproducibility of data

National Science Standard Links (grades 5–8)

This activity is linked to the National Science Standards in the following areas:

- Content Standard A — Design and conduct a scientific investigation; Use appropriate tools and techniques to gather, analyze, and interpret data; Develop descriptions, explanations, predictions, and models using evidence; Think critically and logically to make the relationships between evidence and explanations; Recognize and analyze alternative explanations and predictions; Communicate scientific procedures and explanations.
- Content Standard C — Structure and function in living systems; Populations and ecosystems; Diversity and adaptations of organisms.
- Content Standard F — Populations, resources, and environments; Risks and benefits.

Materials

To be provided by the teacher:

- Published field guides (see Resources page 155)
- Field journals created by each student
- Completed pre-visit plant and animal identification activity sheets

To be photocopied from this guide:

- **Forest & Layers** Activity Sheet
- **Create a Food Chain** Activity Sheet
- **Food Pyramid** Activity Sheet
- **Monitoring Ecosystem Health** Activity Sheet

Vocabulary

baseline data, distribution, dominance, ecosystem, ecosystem inventorying, food chain, food pyramid, food web, monitoring

Procedures

1. Distribute activity

- A. Have students work in groups.
- B. Using the “Forest Layers” Activity Sheet, have students list where they observed each plant and animal from their field journals.
- C. Discuss and list all species on the blackboard.

2. Food chains and food pyramids

- A. Explain food chains.
- B. Have students create possible food chains.
- C. Use the species that were seen as well as known prey and predators that were not seen but are likely to be present in the habitat. (See Teacher Information Sheet, “Food Chain” example).
- D. From the food chain activity explain food pyramids.
- E. Create food pyramids. (See Teacher Information Sheet, “Food Pyramid” example).
- F. Explain the flow of energy that is present in food pyramids.

3. Topic for Discussion #1

- A. What happens when one level of a food pyramid is missing?
- B. Create hypotheses to determine the outcomes if certain levels of the pyramid are removed.
- C. Possible scenarios:
 - 1) Deer are over hunted.
 - 2) Top predators are removed because they harm livestock.
 - 3) Birds of prey are not reproducing successfully because of chemical contamination.
 - 4) Plants and habitat are lost to development.
 - 5) Acid rain kills large trees and other plants.
 - 6) Loggers harvest large tracts of forest; streams fill with silt, forests are cleared and seedlings replace tall trees.
 - 7) Nonnative species overwhelm the habitat.

4. Topic for Discussion #2

If we did not see all of the species in our food pyramids or all of their population, how can we determine if the habitat and ecosystem are healthy or if there are any problems like the ones we talked about above?

- A. Have students complete “Monitoring Ecosystem Health” Sheet from this unit.
- B. Brainstorm, as a class, ways in which you could monitor these species.
- C. Compare your ideas with some of the Point Reyes’ inventorying strategies. (Note to teacher: see the “Briefing Sheets” in this lesson.)

5. Pre- and Post- Evaluation

If you saved the “Pre- and Post- Evaluation” Activity Sheets from the first pre-visit lesson, redistribute them back to the original students. Explain that students may change their answers based on what they have learned in class and on their field trip. If you choose this option, have students write in a different color pen or pencil with the date written in that color.





If you did not save the original Activity Sheets, make copies for each student of the “Pre- and Post- Evaluation” Activity Sheets (located in the first pre-visit activity: **How Do We Identify the Plants and Animals of Point Reyes National Seashore?**).

We would like to see the results of these evaluations! Please consider mailing completed “Pre- and Post- Evaluation” Activity Sheets back to Point Reyes National Seashore. We would like to measure the success of this curriculum and your teaching in changing knowledge, skills, and abilities.

Mail to: National Park Service
Point Reyes National Seashore
Division of Interpretation
attn: Education Specialist
Point Reyes, CA 94956

Extension Activity

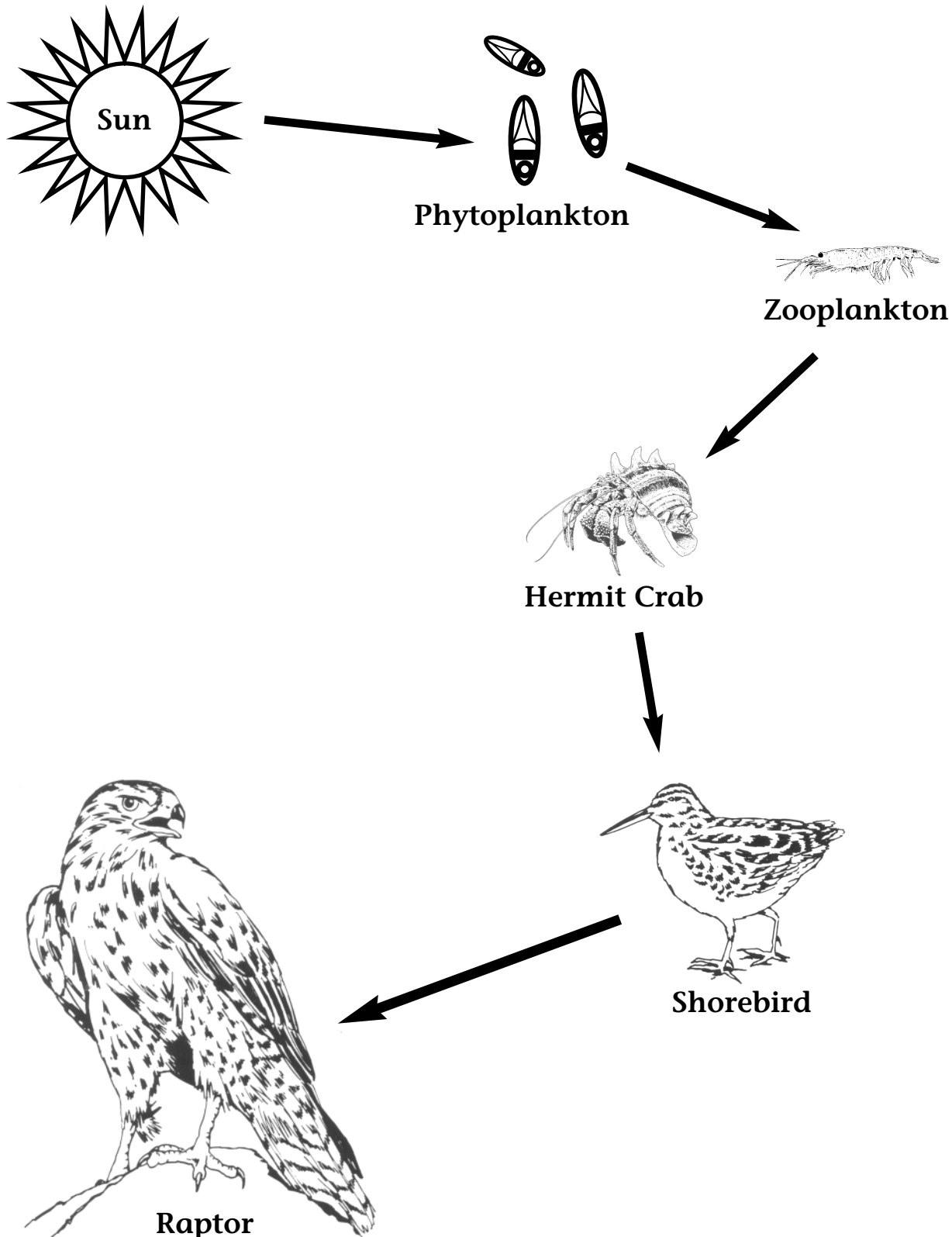
Photocopy and pass out Briefing Sheets at the end of the lesson. Allow students to read and explain some of the monitoring projects at Point Reyes to the entire class.

Create a Food Chain



Activity Master

Use the animals that were observed on the field trip and their known prey and predators to create a food chain.



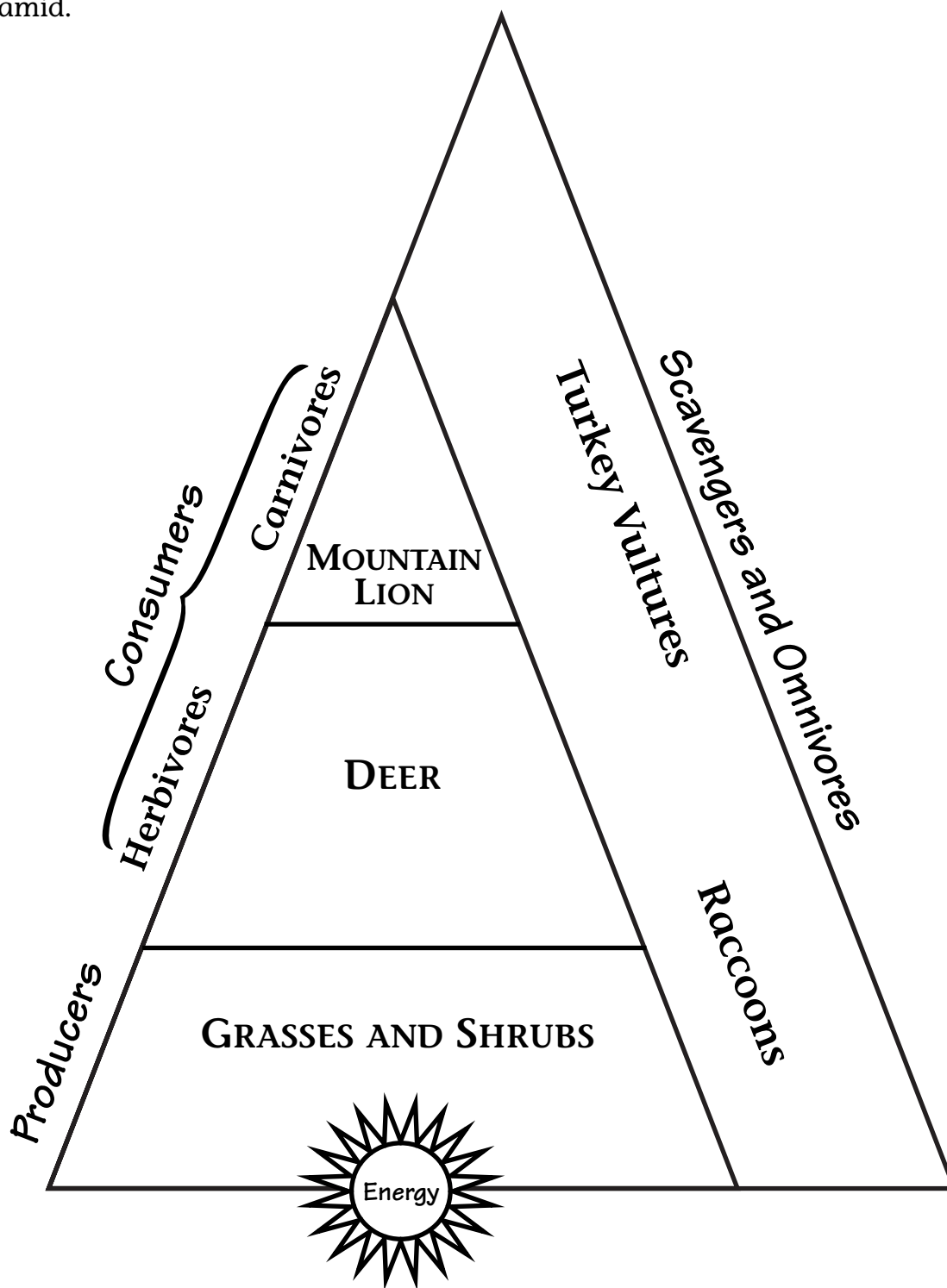


Food Pyramid

Activity Master

Note to Teachers: Food chains are sometimes misleading. Food chains determine links between species but do not address the number of a specific animal population that a specific habitat can support. Food pyramids can help to clarify this.

For example: It takes many more individual grasses and shrubs to support the deer that feed on them. The same is true for the deer the mountain lions that feed. The number of mountain lions that are sustained by the herd of deer will be significantly smaller than number of the deer they feed on. This narrowing of species is a food pyramid.



Monitoring Ecosystem Health



Activity Master

Read NP 10 of the newspaper. Determine which category of species you would monitor and why. Give an example of each.

1. Federally threatened and endangered species because they are close to extinction. **Example: Northern spotted owl**
2. Sensitive species are monitored because they are often good indicators of total ecosystem health and disturbance. **Example: Common murre**
3. Keystone species often are integral to the health of the entire ecosystem because many other species depend on them for their survival.
Example: Bishop pine trees
4. Heroic species are studied and monitored because their wildness and symbolism are important to us as a society and demand their protection.
Examples: Tule elk and elephant seals

In the article, find one example of how ecosystems are being monitored at Point Reyes National Seashore. List it below.

- **Habitats and ecosystems are monitored by using volunteers and staff to collect field data through observation.**
- **Remote trail cameras and live-trapping arrays are also used as a tool to sample animal diversity.**

Brainstorm some ways that you would monitor the ecosystems and habitats of Point Reyes. Make sure to include what species of plants and animals you would study and why.

- **Answers will vary; compare to actual monitoring systems listed in Teacher Information Sheets.**

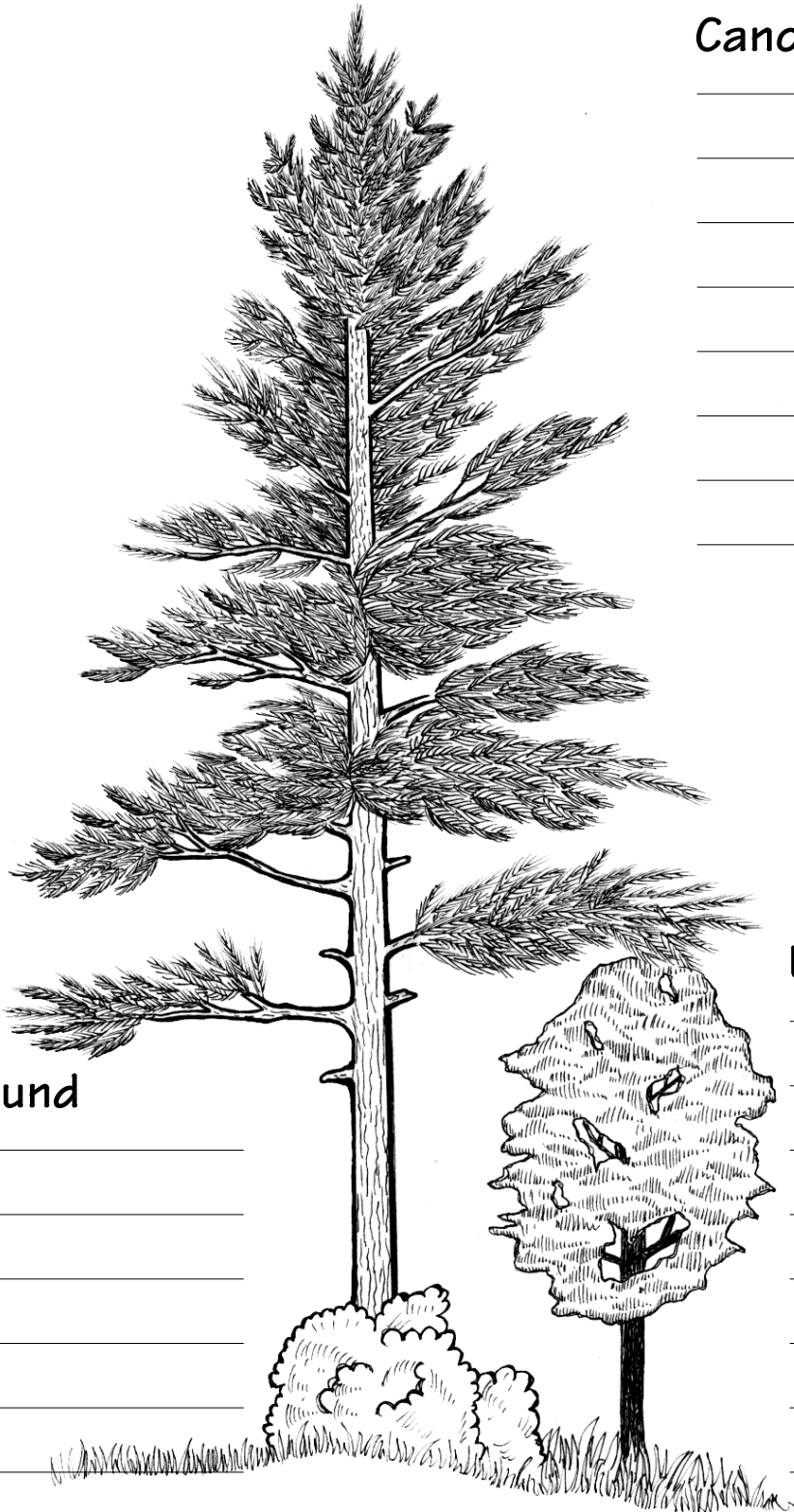


Forest Layers



Activity Sheet

List the forest layer where most observed species were found.



Canopy

Understory

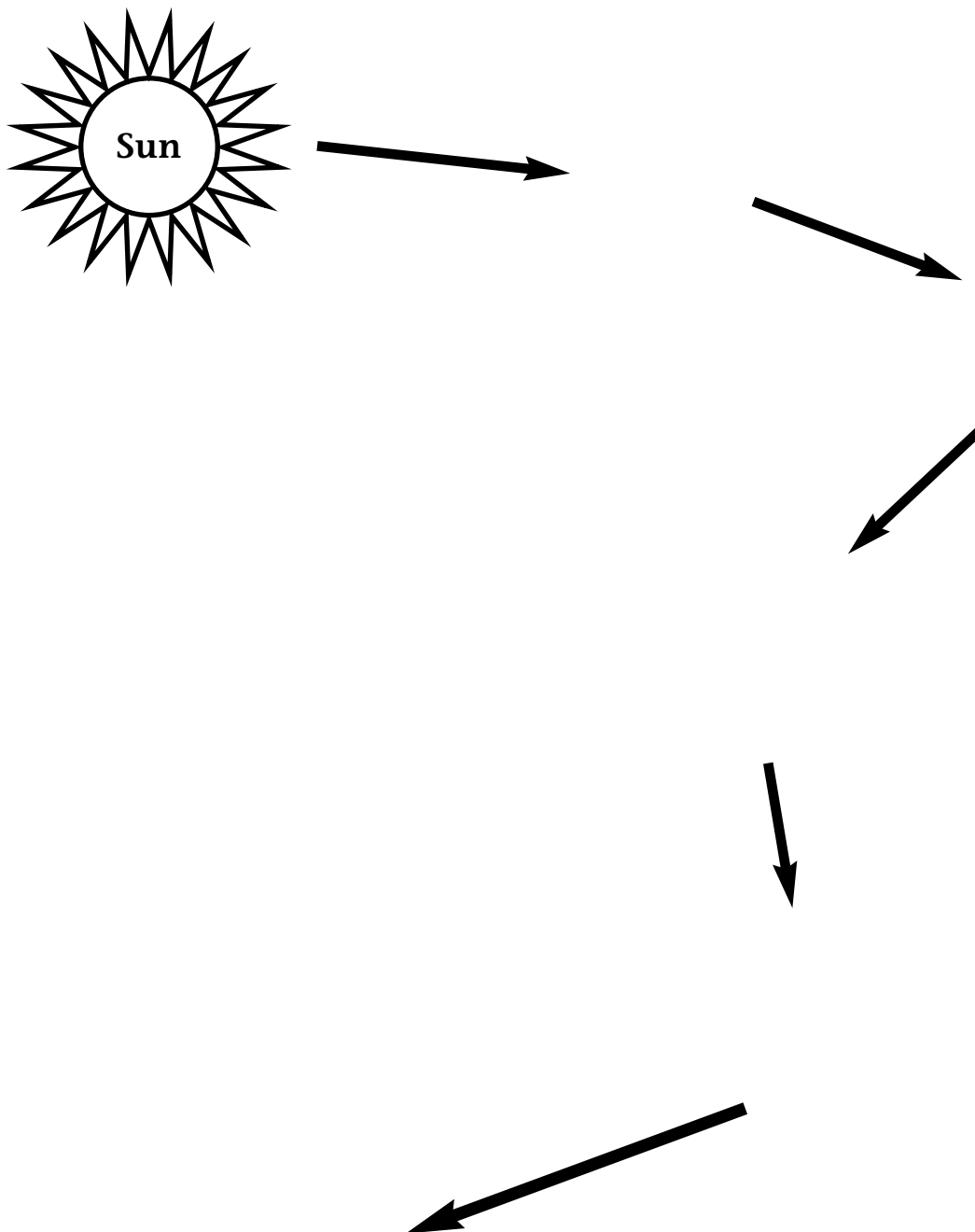
Ground



Create a Food Chain

Activity Sheet

Use the animals that were observed on the field trip and their known prey and predators to create a food chain.

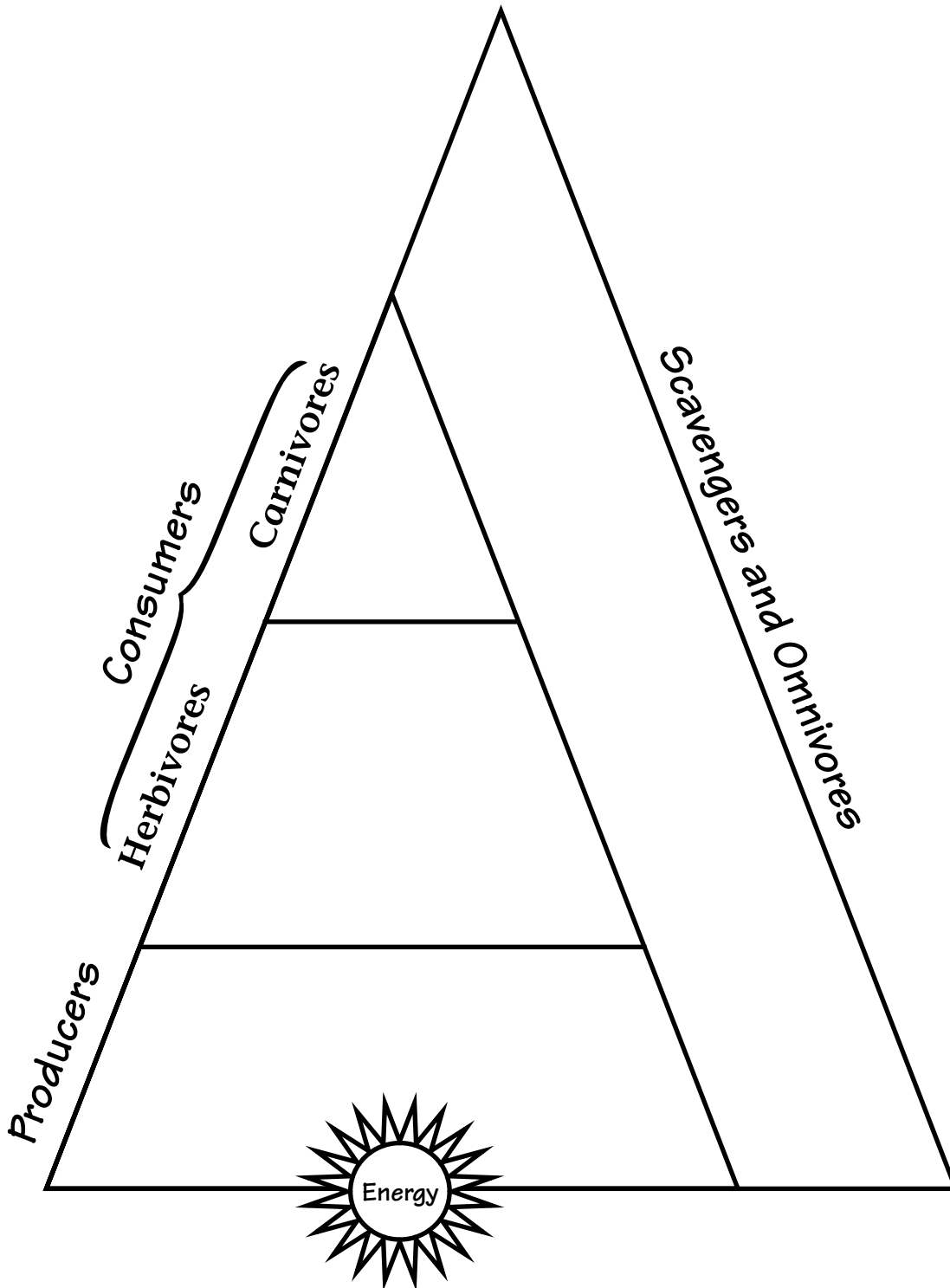


Food Pyramid



Activity Sheet

Build a food pyramid from your food chain on the previous page.





Monitoring Ecosystem Health

Activity Sheet

Read NP 10 of the newspaper. Determine which category of species you would monitor and why. Give an example of each.

1.

2.

3.

4.

In the article, find one example of how ecosystems are being monitored at Point Reyes National Seashore. List it below.

Brainstorm some ways that you would monitor the ecosystems and habitats of Point Reyes. Make sure to include what species of plants and animals you would study and why.



Briefing: Mammal Inventorying and Monitoring, Phase One Live Trapping and Remote Photography

What is the objective of the project?

The project, which is being conducted by the US Geologic Survey, Biological Resources division, has been implemented to determine what animal species are present at Point Reyes National Seashore, where, and in what concentration. This information provides data that can help in assessing the overall health of the ecosystem. The data also establish a baseline that can be used to detect any changes in mammal populations that may affect each of the studied habitats.

How long is the study going to last?

The first phase of the study is scheduled to last 3 years. Fall 2000 is the final year of the project.

Where does the study take place?

The study is conducted at eight habitat locations:

Bishop pine:	2 locations
Douglas fir:	2 locations
Riparian:	1 location
Grassland:	1 location
Coastal Scrub:	2 locations

How is the study performed?

Each location has one remote sensing camera triggered by an infrared beam. When the infrared beam is tripped by an animal, the camera takes a photo of the species in the area of the beam. Each location also has four live-trap arrays located 50–100 yards apart for small mammals, amphibians, and reptiles. (See array photo.) Each site is checked daily for one week each month. When sites are not being checked, all traps are closed.

In total, there are 32 live-trap arrays and 8 remote sensing cameras throughout the park.

What is being learned by the study?

Both the arrays and the cameras provide important information not previously known about the ecosystem and habitats of Point Reyes National Seashore. The information provides a baseline for all future monitoring.

Currently the ecosystem is deemed healthy by biologists.



Phase Two: Monitoring (Implemented after inventorying is complete, Fall 2000)

What is the objective of the project?

The second phase of the project is designed to monitor ecosystem health, to identify any changes in species population, and to identify management strategies that can keep the ecosystem healthy. The data collected in the monitoring phase will be compared to inventorying data. This comparison will be used to monitor the future health of the ecosystem.

How long is the study?

The study will start in the fall of 2000 and continue on a small scale indefinitely.

Where will the study take place?

The study is conducted at 16 habitat locations:

Bishop pine:	2 locations
Douglas fir:	3 locations
Riparian:	2 locations
Grassland:	4 locations
Coastal scrub:	4 locations
Redwood:	1 location

What are the methods?

The methods are the same as Phase One of study (inventorying) but less intensive. Through the inventorying process, two important times of year have been identified for monitoring. These two time periods give an accurate sampling for the entire year. Monitoring arrays and collection of data will be performed only at these times.

Briefing: Endangered Red-legged Frog Monitoring



Teacher Information

What is the objective of the project?

To date, very little is known about the endangered red-legged frog. The project, which is being conducted by the US Geologic Survey, Biological Resources division, is designed to better understand red-legged frog behavior to develop sound management practices.

When does the project take place?

Research is done throughout the year with the concentration of work in the fall, winter, and spring.

How is the study performed?

In the breeding season (winter), the location and number of egg masses are recorded. Throughout the year, individual frogs (currently 15) are radio tagged and tracked to determine nonbreeding behavior. Frogs are also pit tagged with small electronic tags that are placed under the skin. These tags work like a barcode allowing researchers to identify and record specific data about an individual frog.

What is being learned from the study?

Researchers are learning accurate information about the red-legged frogs. Currently there are fewer than 50 known breeding sites at Point Reyes. Additionally they are learning about frog behavior in the nonbreeding season. This information is being used to develop effective management strategies.



Briefing: Coho Salmon and Steelhead Trout Restoration and Monitoring Project

What is the objective of the project?

The principal aim of the project is to restore endangered coho salmon and steelhead trout to the streams of the National Seashore and other federal lands. This is done by improving streams and waterways for coho salmon and steelhead trout habitat and breeding.

When is the project active?

The project is active all year with different aspects of the project occurring when environmental conditions and fish biology are appropriate.

Which streams and watersheds are involved in the project?

Olema, Lagunitas, Redwood and Pine Gulch Creeks and their tributaries are all being monitored and improved where necessary.

What actions are being taken to improve coho and steelhead habitat?

1. Obstacles to fish migration upstream are being removed by creating natural fish passage structures.
2. Riparian corridors are being restored by planting native riparian plants like willows and removing cattle from the streambeds.
3. Creeks are monitored using 100-meter index sections that typify major stream habitat types in the watersheds.
 - a. Each index section is “fished” using an electrofishing device. Fish are momentarily stunned and collected. They are weighed, measured, and counted.
 - b. Steam populations are extrapolated based on data collected in the index sections.
4. Spawning fish are surveyed by volunteers and researchers.

The number of spawning fish is recorded during the rainy season when steelhead and coho are traveling up the stream corridors to determine ideal habitat and extrapolate fry populations.
5. Estimating smolt numbers.

Fish moving out to sea are trapped, counted, and released to extrapolate the number of fish surviving from fry to smolts.

All data are used to determine long-term trends in populations and to gauge the success of restoration projects.

Briefing: Northern Spotted Owl Inventorying and Monitoring Project



Teacher Information

What is the objective of the project?

The purpose of the project is to document and determine nesting productivity of the threatened northern spotted owl. Trends can be quantified to determine the long term productivity and density of northern spotted owls. Based on the collected data, appropriate management actions can be taken to protect the Point Reyes species population if necessary.

When does the monitoring occur?

Monitoring occurs February through September.

Where does the monitoring occur?

The Seashore is working with federal and state management in Marin County to monitor all suitable habitat in the county. Within the Seashore monitoring occurs in the forests of the Inverness and Bolinas Ridges.

What are the methods?

1. Field researchers locate owls by calling them via taped owl call or voice call that imitates the northern spotted owl.
2. If there is a response from the owl, researchers find its location.
3. Researchers determine if the owl is a solitary owl or part of a pair. If it is a pair the owls are observed to find their nest, if present.
4. Researchers return to the nesting site once a week to determine fledging success.
5. Data are analyzed and compared to previous years to determine positive or negative trends.





Briefing: Elephant Seal Monitoring

What is the objective of elephant seal monitoring?

By monitoring elephant seals at Point Reyes, researchers and scientists determine trends in the age and sex structure of the seal populations, migration, and reproductive success. These data are used to determine trends and quantify annual reproductive success.

When does the monitoring happen?

Elephant seals arrive at Point Reyes in December to give birth to pups and breed and stay through March. From May through July, seals return to Point Reyes to molt (shed and regrow their entire fur coat).

Where does the monitoring happen?

The monitoring occurs in all the elephant seal colonies that are found on the Point Reyes Headlands, including the Drakes Beach colony that is visible from the Elephant Seal Overlook near the Chimney Rock parking lot.

What are the methods?

Researchers visit elephant seal colonies regularly during the pupping and mating season. They count the number of elephant seals according to age and sex, births and deaths, and document unusual behavior.

1. Some seals are tagged to provide information on migration and site fidelity for breeding.
2. Other seals are fitted with radio tags to track and transmit information on seal behavior while at sea. These temporary radio tags fall off when the animal molts.

Briefing: Intertidal Monitoring



Teacher Information

What is the objective of intertidal monitoring?

The objective is to create a system for long-term tracking of the Point Reyes intertidal environment integrity. This will establish a baseline condition for monitoring and documenting changes to this area, whether they are natural (plant succession, strong storm damage) or human-caused (oil spills).

When does intertidal monitoring happen?

Resource Management surveys the site twice a year, usually around November and May, during a low tide series.

What locations are surveyed?

1. Bolinas Point
2. Elephant Rock/McClure' Beach,
3. Santa Maria Creek/Coast Camp (near Sculptured Beach).

How were these locations chosen?

These locations are distributed as evenly as possible along the study area coastline, while also avoiding areas utilized by sensitive bird and mammal species.

What sites are surveyed at these locations?

There are two subareas in this habitat that are surveyed: areas characterized by algae and areas characterized by California mussels.

There are two types of surveys at each subarea: fixed and random. The same methods (see below) apply to both types.

Fixed: these sites are the same each year and allow annual changes of the exact location to be documented. They are marked by cattle tags and can be located by using a permanent mark, compass, or GPS (global positioning). Sometimes wave action will remove the cattle tags.

Random: Twenty-four numbered weights are thrown out randomly and all weights are picked up except weights numbered 1-6. They are left where they landed. These will be surveyed with the methods listed below.

The end result at the Rocky Intertidal Habitat is six random and six permanently marked samples in both the mussel-dominated and algae-dominated assemblages. (Repeated at Bolinas Point, Elephant Rock, and Santa Maria Creek).

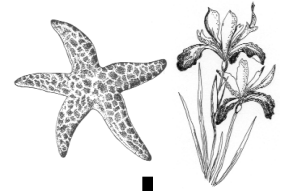


Briefing: Intertidal Monitoring (continued)

How is the Rocky Intertidal Habitat monitored?

- 1. To monitor sessile (stationary) species and substrate (rock) percentages:**
A tablelike setup with adjustable legs is placed over the site to be surveyed. The tabletop is a rectangle shaped Plexiglas with 160 bored holes and 25 pre-designated random points labeled. A long pin is dropped through each random hole and a record is made of what the pin hits. Each hit will represent 2.2% of that species distribution. Hits included: seaweed/algae, barnacle, mussel, substrate.
- 2. To monitor other species present:** A plastic rectangular frame is laid down directly under where the Plexiglas table stood. Any other species in the perimeter which are present, but not recorded by a pin hit, are documented.
- 3. To monitor motile (moving) species:** A square frame is laid down in the center of the plastic rectangular frame. All motile species are counted and recorded. Species include: predatory whelk (*Nucella* spp.), periwinkle (*Littorina* spp.), black turban snail (*Tegula* spp.), isopod, chiton, and worms.
- 4. To monitor sea stars:** Someone walks the entire designated area and counts each type of sea star present. Species include: purple sea star (*Pisaster ochraceus*), bat star (*Patiria giganteus*) and common sea star (*Pisaster giganteus*).
- 5. Photo documentation:** a bird's-eye photo was taken of every survey site and 72 other random photos were taken.
- 6. Disturbance survey:** any noted disturbances such as sand inundation, rock exfoliation, oil, or evidence of otter feeding are also photographed. Salinity and water temperature are also noted.

How Do I Choose and Complete the Best Stewardship Project?



Post-Visit

Lesson Plan

The final lesson for this unit synthesizes all previous learning experiences. Students have had the opportunity to gain an understanding of habitat types and some of the threats to their sustainability. Now it's time to take action to keep habitats distinct, native, and healthy for the variety of organisms that depend on them, including humans.

Time required: time varies

Location: classroom, community, or Point Reyes National Seashore

Suggested group size: entire class

Subject(s): biology, art, computer skills, community service

Concept(s) covered: stewardship, educating others, environmental responsibility

Written by: Lynne Dominy and Christie Denzel Anastasia,
National Park Service

Last updated: 10/07/00

Student Outcomes

At the end of this activity, students will be able to:

- Synthesize all other pre-visit, on-site, and post-visit lessons from this unit.
- Plan and implement an environmental stewardship activity to benefit the ecosystem they live in and depend upon.

National Science Standard Links

As a result of this activity, all students in grades 6–8 should develop:

- Content Standard F—Science in Personal and Social Perspectives; Populations, Resources, and Environments.

Materials

To be provided by the teacher:

- Varies by project, see Teacher Information “Defining Habitats: Environmental Stewardship Projects”

Vocabulary

stewardship

Creating
COASTAL
STEWARDSHIP
through Science





Procedures

Post-Visit Lesson Plan

1. **Decide on lesson approach based on time limitations**

Review the Teacher Information “Defining Habitats: Environmental Stewardship Projects” following this lesson. This teacher resource explores the range of stewardship projects your class can complete according to time constraints. There are many possibilities ranging from short lessons to more in-depth, interdisciplinary projects that may fulfill educational standards for other subject areas.

2. **Prior to starting a stewardship project, introduce the concept of environmental stewardship**

Begin a discussion of who has responsibilities for natural resources. There are federal agencies such as the National Park Service, United States Forest Service, state agencies such as California Fish and Game, and local organizations. Introduce the concept that organizations such as schools and individuals such as students also have responsibility.

Based on our daily behaviors, we choose what our impacts are to the environment. They are usually positive or negative, rarely neutral.

3. **Lesson options**

- How to Positively Affect Species and Their Habitats
- Create Tools to Educate Others
- Implement a Community Project
- Participate in Volunteer Programs at Point Reyes National Seashore
- Support Stewardship Organizations and Be an Advocate for Your Beliefs

(see the Teacher Information “Defining Habitats: Environmental Stewardship Projects” following this lesson for more details)

4. **Assist with evaluation of *Creating Coastal Stewardship through Science***

Please share your project ideas and results! If you develop a website, host a *Coastal Stewardship Day*, or participate in a beach cleanup, let us know by sending photos, stories, or student materials. Call (415) 464-5139, to leave a message with the Education Division of Point Reyes National Seashore.

Defining Habitats Environmental Stewardship Projects



Teacher Information

How to Positively Affect Habitats.

One to two lessons

Students use the “How to Positively Affect Land Habitats” or the “How to Positively Affect Seashore Habitats” Activity sheet (at the end of this lesson) to learn more about how species become extirpated from land habitats and how nonnative plants can destroy native dunes. Based on that investigation, students devise action plans for which they assume responsibility for contributing toward healthy habitats.

Create Tools to Educate Others.

Arranged in order of possible time commitment, shortest to longest

Lead a class discussion to brainstorm ways students can educate others. Use the list below to help students generate ideas. Once there are a number of ideas, decide which project can be completed within a designated timeframe. The next step is to have students create a “plan of action”. What are all the things that need to be done, in which order do they need to be done, who is going to do them, and what are the deadlines? How can students not only teach about the resource, but also impart stewardship values? Remind students to think about any safety issues and address these as a group.

Educational tool ideas:

- Develop a newsletter or newspaper to distribute to other students.
- Build an exhibit that is displayed for a parents’ open house.
- Paint a mural, draw posters, or create a website that encourages habitat Stewardship.
- Interview a researcher about a habitat restoration project. Share the answers.
- Organize a Coastal Stewardship Contest. Have students define stewardship through writing essays or creating art, poetry or music.
- Videotape your field trip and stewardship activities. Have the students narrate this video and develop a presentation for other students sharing what they have learned and accomplished.
- Create a mentoring program that enables your students to teach younger students about resources and their stewardship.



Defining Habitats Environmental Stewardship Projects (continued)

Implement a Community/School Project.

Arranged in order of possible time commitment, shortest to longest

Instruct students as a homework assignment to find at least one local environmental issue that is being discussed among community members. Students may gain this information by looking through newspapers, talking to their parents, watching the local news, or listening to a public radio station. The next day in class, all local environmental issues should be discussed to some extent. Choose one project around which students may design a stewardship project. What are the possible stewardship activities that can be completed by students, and/or their parents, and communities? Follow the ideas in the procedure above to create a “plan of action”.

Community/School Project Ideas:

- Practice water conservation at school and home.
- Create a green school: investigate recycling and composting facilities or water conservation. Create a native plant garden. Have students write a plan about how to make your school more environmentally friendly. Have them take action and implement some of their ideas.

Participate in Volunteer Programs at Point Reyes National Seashore.

Two hours, full day, or regular commitment on weekly/monthly basis

Students may participate in programs at Point Reyes National Seashore such as restoration, rehabilitation, or research projects. Consult with the Volunteer Coordinator or Education Specialist for the most recent options, as projects can change according to time of year and staffing availability. One example of participating in a restoration project is to remove nonnative plants from natural areas. To participate in the habitat restoration projects at Point Reyes National Seashore call (415) 464-5139. Habitat restoration may also be done in conjunction with your Park field trip, when it is arranged two or more weeks in advance. A beach cleanup may also be scheduled in conjunction with habitat field trips, when it is requested in writing in advance. Visit the Seashore’s website at www.nps.gov/pore for more information on scheduling these opportunities.

Defining Habitats Environmental Stewardship Projects (continued)



Teacher Information

Support Stewardship Organizations and Be an Advocate for Your Beliefs.

One lesson to lifelong commitment

Introduce students to the concept of advocacy. Have them research and represent the missions of local and national stewardship organizations. Examples include: the National Park Service, the Marine Mammal Center, the Humane Society, the Sierra Club, the National Parks and Conservation Association, and the Audubon Society. Have students write letters to their local, state, and national government officials regarding issues, or have them submit articles to local newspapers. Encourage students to form educated opinions and to voice them.



Name _____ Date _____



Activity Sheet

How to Positively Affect Land Habitats

Choose and research one of the following species to answer the questions below:

- | | |
|--|------------------------------|
| <input type="checkbox"/> Gray wolf | <i>Canis lupus</i> |
| <input type="checkbox"/> Grizzly bear | <i>Ursus arctos</i> |
| <input type="checkbox"/> Black bear | <i>Ursus americanus</i> |
| <input type="checkbox"/> Marten | <i>Martes americana</i> |
| <input type="checkbox"/> Fisher | <i>Martes pennanti</i> |
| <input type="checkbox"/> Mink | <i>Mustela vison</i> |
| <input type="checkbox"/> Wolverine | <i>Gulo luscus</i> |
| <input type="checkbox"/> River otter | <i>Lutra canadensis</i> |
| <input type="checkbox"/> Pronghorn antelope | <i>Antilocapra americana</i> |
| <input type="checkbox"/> Showy Indian clover | <i>Trifolium amoenum</i> |
| <input type="checkbox"/> Yellow larkspur | <i>Delphinium luteum</i> |

Investigation

All of the species listed above have been extirpated from Point Reyes National Seashore. Some of them have been extirpated from the entire state of California. What is meant by “extirpated”?

Why is this species extirpated in California?

What are the specific threats to this species habitat?

Why should we care about keeping this species in Point Reyes National Seashore or in California?





Name _____ Date _____

Activity Sheet

How to Positively Affect Land Habitats (continued)

Problem Solving

If you could create a "Recovery Plan" for your species in California, what three recommendations would you include in your report?

1.

2.

3.

Decision Making

National Park Service policy calls for restoring native species that have been eliminated as a result of human activity if:

"adequate habitat exists to support them, and the species can be managed so as not to pose a serious threat to people or property outside the Park."

Based on this policy, place check marks next to the species you think could be restored at Point Reyes National Seashore.

Resolution

What three things could you do to increase the chances of a chosen species recovering in California?

1.

2.

3.





How to Positively Affect Seashore Habitats

Activity Sheet

Learn about some species of coastal dune habitats to understand how they function and how your actions will keep them healthier.



NPS Collection

Western Snowy Plover

Charadrius alexandrinus nivosus

A federally threatened species whose numbers have been decreasing due to a loss of suitable habitat, especially during nesting and fledgling periods. Snowy plovers require unstable, flat, open areas with thin ground cover. Introduced plants reduce shifting sand areas and increase habitat for predators of plover eggs and young.



Walter Knight, CA Academy of Sciences

Pink Sand Verbena

Abronia umbellata breviflora

This plant grows along dunes and back beaches. It has been replaced by European beach grass as the dominant vegetative species.

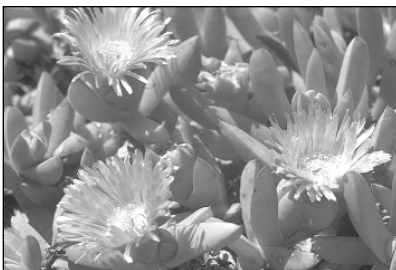


Brother Alfred Brousseau,
CA Academy of Sciences

European Beach Grass

Ammophila arenaria

This grass was brought to North America from Europe as a dune stabilizer. It tends to form dense mats of grass that prevent establishment of native species. Its dense growth captures sand and prevents natural movement of dunes.



Charles Webber, CA Academy of Sciences

Ice Plant

Carpobrotus edulis

Ice plant is a hardy plant able to withstand drought or being uprooted (for a short period of time). It grows low to the ground and blankets the dunes with its sprawling swollen leaves. Originally native to South Africa, this plant was used as roadside erosion control.



How to Positively Affect Seashore Habitats (continued)

Investigation

How is the western snow plover affected by European beach grass?

How is pink sand verbena affected by ice plant?

List three elements of an ideal coastal dune habitat:

1.

2.

3.

Resolution

Place check marks next to things you can do to help preserve coastal dunes.

- ☐ Volunteer to remove ice plant with a habitat restoration group.
- ☐ Plant European beach grass in my garden.
- ☐ Respect enclosures on beaches meant to protect western snowy plover nesting sites and fledglings (especially March through September).
- ☐ Play volleyball directly next to a western snowy plover nest.
- ☐ Respect pet restriction areas—leash dogs on all beaches with signs posted for western snowy plovers.
- ☐ Approach enclosure fencing to scare western snowy plovers off their nests.
- ☐ Walk close to the water in wet sand instead of the flat dry sand and driftwood before the dunes to avoid disturbing western snowy plover nests.
- ☐ Stick driftwood upright on beaches so predators such as ravens can get an opportunity to hunt western snowy plovers.